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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/371,955	08/11/1999	SHANE P. LEIPHART	M4065.0196/P	9847

24998 7590 08/27/2003

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L STREET NW
WASHINGTON, DC 20037-1526

EXAMINER

KANG, DONGHEE

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/371,955

Applicant(s)

LEIPHART, SHANE P.

Examiner

Donghee Kang

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Remarks

1. The indicated allowability of claims 26-35 & 37-40 are withdrawn in view of the newly discovered reference(s) to Cerio, Jr. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims **26-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fiordalice et al. (US 5,358,901) in view of Cerio, Jr (US 6,268,284).

Fiordalice et al. teach a semiconductor device, comprising (Fig.8):

a metallic layer (aluminum, 41) over a substrate (10); a dielectric layer (51) over said metallic layer; a via hole (52, in Fig.5) extending through the dielectric layer to a surface of the metallic layer; a first titanium aluminide layer (61) lining at least a bottom of the via hole; a conductive material (TiN, 72) on the first titanium aluminide layer, said conductive material and said first titanium aluminide layer being in contact at an interface; a conductive plug (73) material on the conductive material (TiN); and a metallic layer (74) on the dielectric layer and electrically connected to the plug material. See also Col.3, line 25-Col.4, line 20.

Fiordalice et al. do not expressly teach the interface is substantially free from tensile stress between said first titanium aluminide layer and said conductive material. However, this feature is inherent because the conductive layer (72) is deposited after forming titanium aluminide layer.

Fiordalice et al. do not teach a second titanium aluminide layer on sides of said via hole. However, Cerio, Jr. teaches depositing a titanium aluminide (TiAl_3) on the bottom and sidewalls of via 40 using sputtering method. In Cerio's device, omission of the annealing step results in a reducing stress voiding since there is no reaction in the via. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the titanium aluminide layer lining a bottom and sides of the via in order to reduce the stress voiding in the via hole.

4. Claims **28-40** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fiordalice et al. in view of Cerio, Jr. and further in view of Harada et al. (US 5,313,101).

Re claims **28-32**, the teaching of Fiordalice et al. as modified by Cerio, Jr. was discussed above in section 3. See a statement of rejection of claims 26-27.

Fiordalice et al. teach the semiconductor device further comprising an antireflective coating (42) over said first metallic layer (41). Fiordalice et al. do not teach a memory circuit region in a semiconductor substrate. However, Harada et al teach in Fig.1 the memory circuit region (2) located on the substrate and is covered by an insulating layer (3). Therefore, it would have been obvious to one of ordinary skill in the

art at the time the invention was made to have a DRAM or SRAM cell and interconnection layer in the ICs in order to make a memory device.

Re claims **33-35 & 37-40**, prior arts do not expressly teach a substrate comprising a memory module. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have module system, since module system includes a plurality of components each storing or reading on binary bit at a time in the semiconductor memory device.

Re claim **36**, Fiordalice et al. do not teach the conductive plug formed on the titanium aluminide layer is aluminum. Harada et al. teach aluminum plug formed on the titanium aluminide layer. Therefore, it would have been obvious to one of ordinary skill in the art to form the conductive plug using aluminum material taught by Harada, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as matter of obvious design choice. In re Leshin, 125 USPQ 416.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Art Unit: 2811

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Donghee Kang
Examiner
Art Unit 2811

dhk